A WEB-BASED LOCATION IDENTIFICATION DIRECTORY FOR SMALL AND MEDIUM BUSINESS ENTERPRISES

SANI, Y. M., ETUK, S. O., ADAMU, M., & ADEOSUN, V. O.

Department of Information and Media Technology, [3]Department of Computer science
Federal University of Technology, Minna, Niger State, Nigeria
E-mail: yahayasani@futminna.edu.ng, abiolastella@futminna.edu.ng, bejian2004@yahoo.com, vicsunited@gmail.com
Phone No: +234-806-591-8550, +234-703-567-4352, +234-807-977-5565

Abstract

This paper presents the design of a web-based business directory particularly for identifying and locating Small and Medium Scale Enterprises (SMEs) within an area of interest. There are various techniques adopted for implementing such systems, with each having its own merit and pitfall. One peculiar problem is the lack of a centralized system where customers, business owners and investors can interact. The design of every directory depends on the type of listing that such directory will hold. This location-based business directory makes use of geocoding and google maps API as well as its own local database where a business name, details and location are stored and can be retrieved by a customer or investor at any time. This business directory will facilitate and optimize the access of Small and Medium Enterprises to ease supplier access to marketing. The goal was achieved by analyzing already existing forms of online directories and classifying business directory for SMEs. This research work was however able to make improvements on existing systems using latest technologies to develop an overall unique solution for new and struggling start up business enterprise.

Keywords- *Business Directory, Small and Medium Enterprises, Identification and Location Technology, Geocoding*

Introduction

According to SMEDAN (2013), small businesses employed 80% of the Nigerian workforce. Despite its importance, most small businesses in the country fail within the first five years, and these failures have been linked to such enterprises not getting the publicity required to survive in their early periods of existence. Small and Medium Scale Enterprises (SMEs) encounter increasing competitive pressure fue1ed by globalization, legislation and the re1axing of trade barriers, as well as an increase in market expansion due to emerging techno1ogies and innovation (Yolande & Watkins, 2012). They ought to put up with outrageous competition posed by large and already established enterprises. Dugguh (2013) however posited that small businesses must develop strategies that will mitigate challenges and sustain operations. Researchers have continued to identify the challenges facing small business and the strategies of mitigating them (Kayode & Ilesanmi, 2014). Typically, small businesses rely on the contact network of owners and managers and sometimes on networks of their customers during the marketing of their products or services (Adegbuyi & Akinyele, 2015). However, the role of information technology in building the credibility of SMEs or 1ocal professions are quiet indispensable. They need a credible system to provide room for user engagement and interaction both when on and off the system so as gain acceptability in the market. It is necessary to bridge the gap between suppliers, SMEs, and consumers (Suselo *et a1.*, 2013). This can be done with the use of technology to map in a web-based business directory if the information about 1ocal professionals, new startups and SME's can be readily and easily accessed by prospective customers, it will help them make more informed decision with a view to gaining competitive advantage.

Background of the Study

In computing, a directory is a file system cataloging structure which contains references to other computer files and possibly other directives. On numerous PCs, directories are known as enve1opes, or drawers to provide some importance to a workbench or the conventional office file cabinet. Files are organized and stored in the same directory only when they are related. In a hierarchical filesystem (that is, one in which files and directories are organized in a manner that resembles a tree), a directory contained inside another directory is called a subdirectory. The terms parent and child are often used to describe the relationship between a subdirectory and the directory in which it is cataloged, the latter being the parent. The top-most directory in such a filesystem, which does not have a parent of its own, is called the root directory. Directories, unlike search engines, are compiled manually using real live humans and these "humans" select sites to be added to the directory, rather than software programs (Salami & Olaniyan-Abdusalam, 2010).

Web directories are usually much smaller than search engines databases, since the sites are looked at by human eyes instead of spiders or software. The searchers work at sites organized in a series of categories menus. There are two ways for sites to be included in a web directory's listings either the site owner can submit the site to the web directory or the directory's editor(s) will eventually come across that site. Information can be found on the web by these two ways: searching or browsing. Web directories provide links in a structured list to make browsing more convenient and easier. Many web directories join searching and browsing by adding a search engine to search the directory. Unlike search engines, which base results on a database of entries gathered automatically by web crawler, most modern web directories are built manually by human editors. Many web directories allow site owners to submit their site for inclusion, and have editors review submissions for fitness. It is however important to ensure that the design of Web directories accommodate the requirements of different cognitive style groups so that every user benefit equally from them (Sherry, 2005).

Related Literatures

Suselo *et a1.* (2013) proposed the analysis and design of a business directory for micro-scale businesses, as well as small and medium enterprises (SMEs) using Google Maps Application Program Interface (API) and Multimedia. The information is being presented in the form of multimedia that can be more interactive. Geocoding was employed in the modelling of the locations so that each location can easily be viewed on the map whereas the map was constructed making use of the functionality of a web-based Google Maps API. In the system developed there are also facilities for searching the location of SMEs with some delay in the search process. The work was however a prototype that was never implemented.

Vijaya Prasad, Nurul, Murad, Abdelrahman and Bader (2013) developed a mobile application for shopping mall directory. The application was aimed at providing information for consumers to enhance their experience in the shopping mall especially large malls. Wi-Fi based indoor positioning system were used to locate consumer's current location, directions from current location to another location, shops' information and map module. The system was limited to customers' experience on shopping mall as it does not cover location and identification.

Rohit, Pravin, Sushant, Sunikumari and Vandana (2016) developed a mobile application for shopping mall directory. The function of this application is to let users know the latest events and promotions that took place at the mall besides providing them a guide at the mall. The directories are divided according to categories such as fashion, food and

beverages, health and fitness and much more. Generally, the application gives a lot of advantages to mobile users who like shopping very much. The system is supported by the online database server which can be manipulated by the administrator of the shopping mall. All the information about a particular shop can be obtained from this application without having to search for the directory board in the mall. The limitation of this work is that the system is mobile-based as web-based users cannot access it.

Afolau, Olatunji and Nwagbo (2016) developed a Point-Of-Interest directory for mobile Tourists in Abuja, Nigeria which allows the tourist to search information about a Point of Interest (POI) from a mobile device that is, can be accessed through wireless devices such as mobile phones, personal digital assistants (PDAs) for the Federal Capital Territory of Nigeria (Abuja). This allows tourists that enters the city, to be able to view necessary information with the help of the application on their android device using the graphical user interface (GUI), right from the selection of interest to when he views desired details. The system works both offline and online. It is designed to meet the need of tourists to Abuja either on vacation, business, or studies. The work is however a prototype, which provides a model for development of that field.

Pete and Jennifer (2016) developed an online directory with contact information, a system for storing and sharing contact information on a website of a specified group of users designated by a user. The system allows the user to add their contact information to the directory so that other people can search for them. The directory is categorized by city and state, province and country, or similar. The system is however only avai1able to only a c1osed group of users for example, family members, business associates and so on.

John Knorr (201l) developed an online geographical directory. It functions as a system for indexing information so that Internet users might locate relevant information according to geographical or spatial location. The system provides a method for categorizing businesses, organizations and individuals to facilitate geographically based search over the Internet. The method inc1udes entry in a database the names of businesses, organizations and/or individuals; for each name entry registering further information such as contact details and a description of the goods or services offered by the business or individual. The major limitation of the system is the fact that the system fails to provide an avenue for business owners and prospective customers (searchers) to interact.

By assessment of the above literature review, none of the systems, research study or framework provides room for user interaction both when on and of the system. This is the gap that the project is set to bridge.

Limitations of the Existing System
The reviewed systems are used for business identification and location, but they have some limitations that make them less effective. The following are the limitations of the existing systems:
(i)   One obvious limitation of most existing systems is lack of proper verification before accepting a particular listing.
(ii)   Most of the existing systems lack proximity listing (the process of returning a search results of available businesses based on how close they are to the user).

Justification of the New System
The internet has fostered the growing interest in location-aware systems and services. A1though the current systems can achieve the basic functionalities in business location and identification, there is a need to improve so many aspects of the existing systems to enab1e

them to provide quick, efficient and timely information to the growing mobile force and business entities.

Tab1e I: Justification of the New System

Criteria	NGCONTACTS	VCONNECT	ZILLOW	The Proposed System
Proximity listings	No	**No**	**No**	Yes
Speed of Business Search	Yes	No	No	Yes
Verification	No	No	No	Yes
Maps/Geotagging	No	Yes	Yes	Yes
Review Section	No	Yes	No	Yes

Table 1 shows the justification of the proposed system with additional functionalities (proximity listing) in other to remedy the limitation inherent in the existing systems (NGCONTACTS, VCONNECT and ZILLOW). 'Yes/No' criteria were used to point out the additional functionalities over the existing systems listed above from the available literatures which make the proposed system to perform better than the existing ones. The proximity listing in the new system, makes it unique, effective and efficient compared to the existing systems listed above.

Methodology

System Design
In this research, waterfall model is used which is a breakdown of project activities into linear sequential phases, where each phase depends on the deliverables of previous ones and corresponds to a specialization of tasks. It is the flexible and less iterative approach.

System Flowchart Diagram
This is used in the analysis of this system to show diagrammatically the sequence of activities. The flowchart shown in Figure 1 demostrates the step by step process performed as the user interacts with the system.
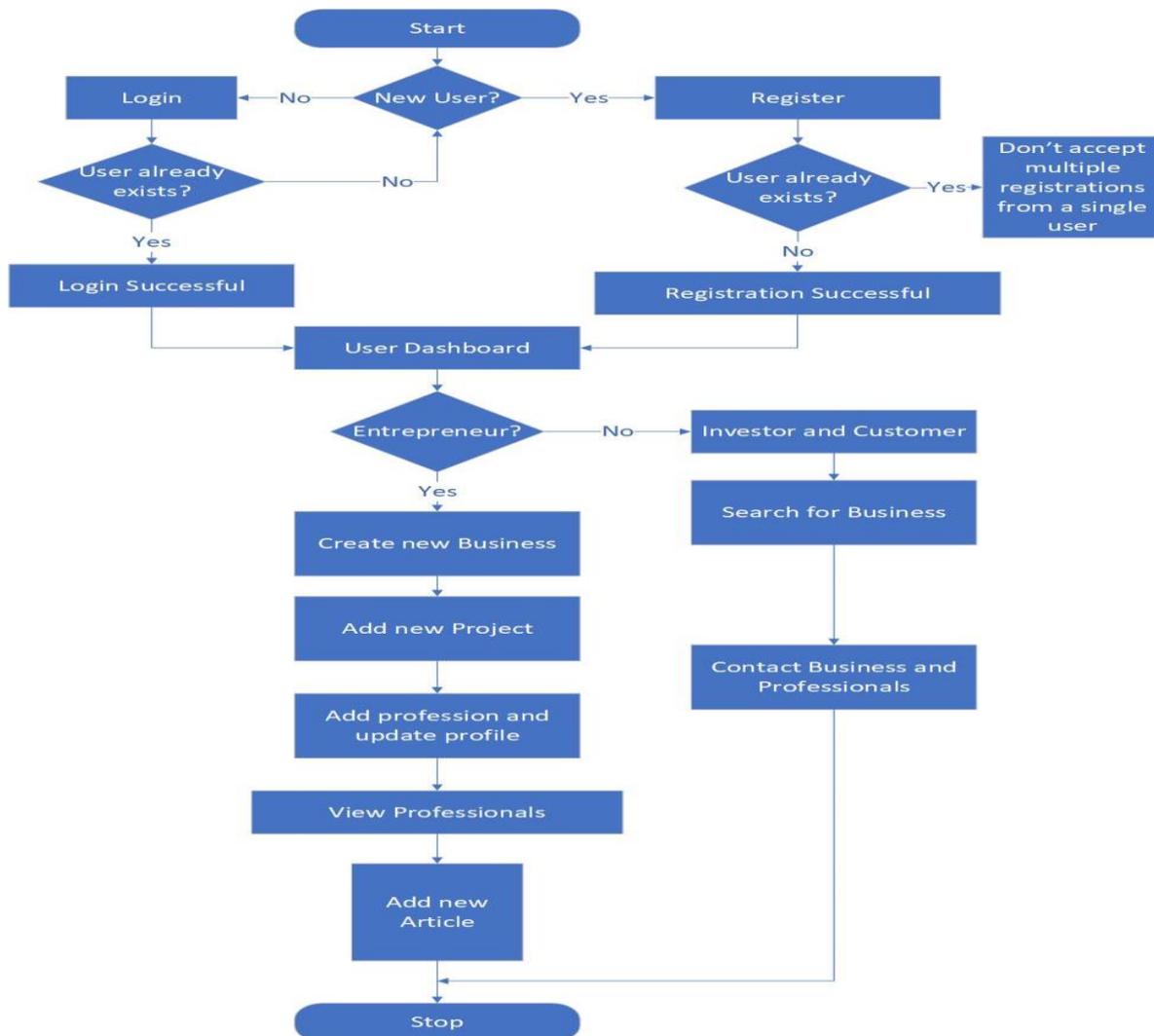
Figure 1:   Flowchart Diagram of the Proposed System

From the flowchart in Figure 1, users of the system are first authenticated before they can gain access to the system. While new users must create an account by providing their details, existing users can simply login to the system with their correct credentials. After successful registration and login, the type of account assigned by default is the Entrepreneur Account from which users can perform operations like updating their profile, adding new profession, creating new business, adding new project, viewing other professionals and businesses, adding new article. On the other hand, Users can upgrade their account to an Investor Account, from which they can search for professionals based on their skills and experience, rate projects and invest in them. Componets and the actors (users) that interact with the system.

Use Case Diagram of the Proposed System
This shows the system components and the actors (users) that interact with the system. This Universal Modelling language diagram explains the users and admin roles respectively by indicating the arrow connecting to the system component and the user or administrator.
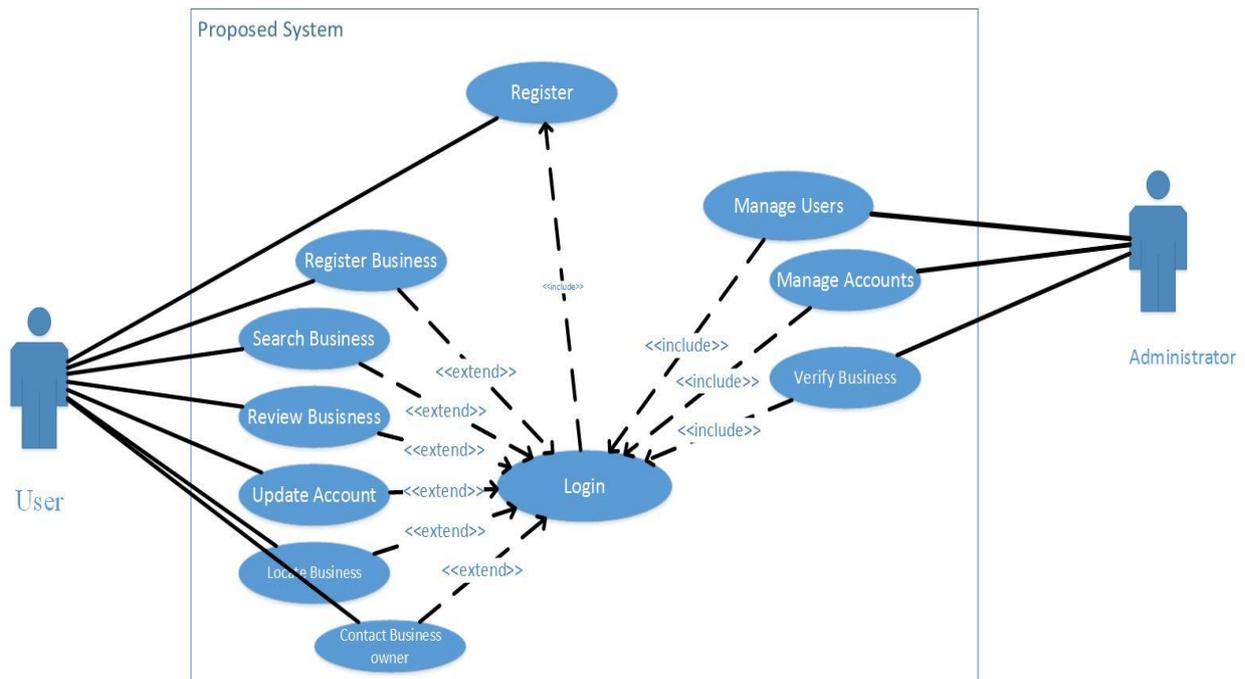
Figure 2: Use Case Diagram of the Proposed System

The use case diagram in Figure 2 shows that the system accommodates two parties, an admin and the users. While the users of the system include both business owners and customers in search of certain businesses, the Admin is the one who manages all users accounts like verifying businesses to ensure their legitimacy as well as proper categorization of the listings. While users (both customers and businesses) must register before they can gain access to the system, the Admin only needs to login with the Admin login credentials. Business owners can register their business as well as search for other businesses, they can review listings based on experiences. They can also view information about listed businesses; information like business name, location, contact information, business description etcetera.

System Architecture of the Proposed System
This design in Figure 3 shows in a simple way on how the identification and location of a business is carried out in the system. It further shows the required components involved in the location and identification of a business. The system comprises of mobile forms usually referred to as activity and embedded database. The architecture is modular, while all functionalities are developed using PHP 1anguage and Laravel framework, MySQ1 was used as database management system. The system which is a web-based application makes use of GPS to search and locate business premises. It can be accessed both via mobile and web browser.
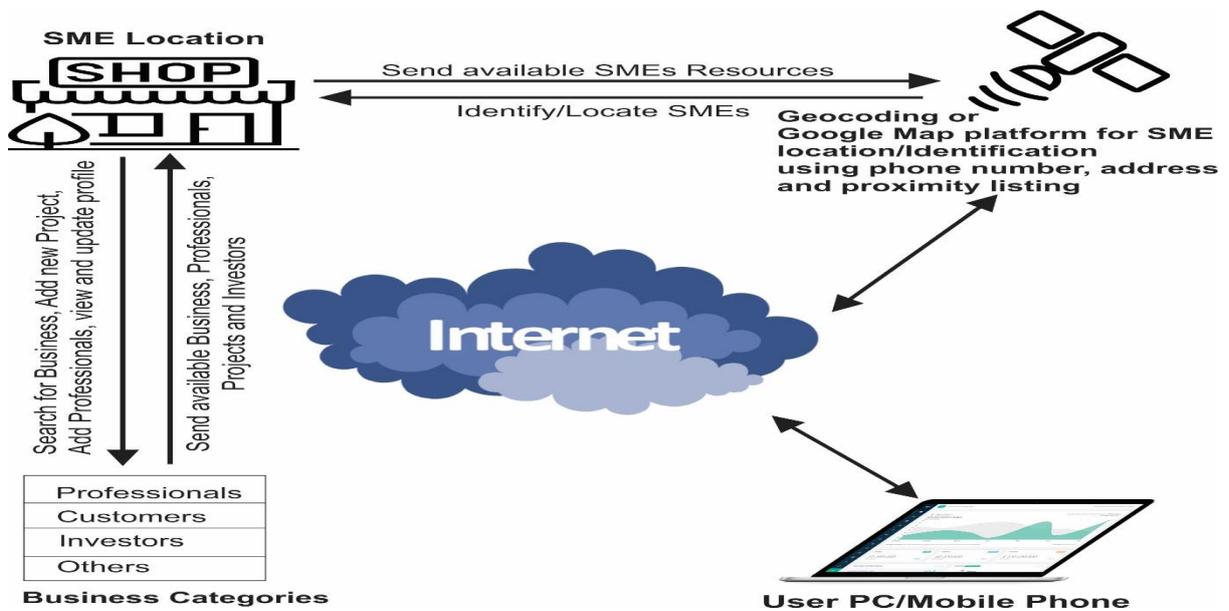
Figure 3: Architectural Design of the Proposed System

Discussion

System Menus Implementation

Immediately the web application is accessed from a browser or an android phone, the home page is displayed, showing a side main navigation, a search bar to search for businesses, a list of businesses around, the home page also carries a link to "Create Account" situated at the top-right hand corner of the page. This is shown in Figure 4.
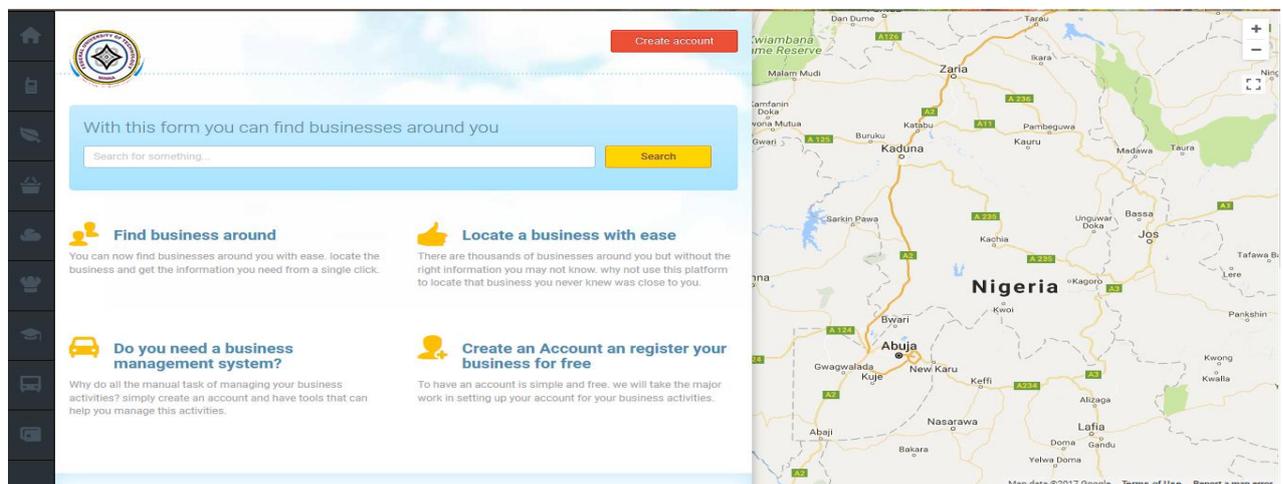

Figure 4: Main Menu of the Business Identification and Location System

Business View Implementation

When a business is clicked, the business is then previewed on a single page showing all the business-related information from the business location, email. Phone number and address. Below the business description is a comment section for the users to make comments on the business. The comment section is to allow other users to know if the business has been providing the services it was listed for. On the same page, a statistical record shows how many users have viewed the business, and this build a level of trust to new users who are searching for business around them. Figure 5 shows the view of how a business page is displayed on the desktop.
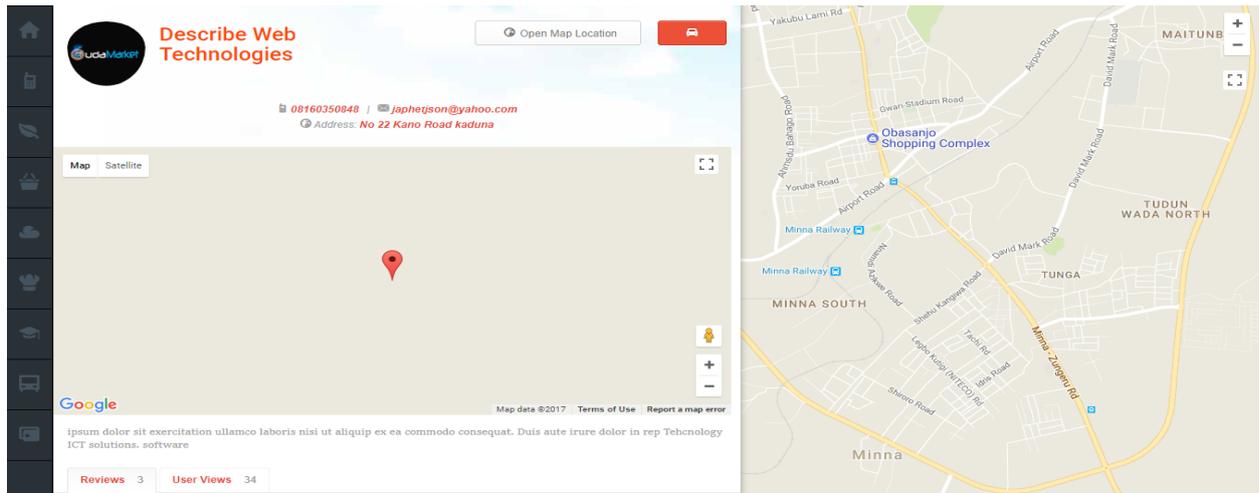
Figure 5: Business View Page of the Business Identification and Location

Authentication Page

The authentication interface was designed to be straightforward and self-explanatory. User email and password is required before access is granted to a user. Security measures were taken to help secure the system, most noticeable among these measures is the Cross-Side-Request-Forgery (CSRF) offered by the framework used to build the application. With this functionality, third-party request cannot submit user credentials underground and gain access. Another security feature in place is the token sent with every login request, this token is refreshed on every request and computed using some hash function that is very difficult to decrypt. Error handling for wrong user credentials or other forms request errors were properly handled and a readable message is always returned to the user interface. On provision of correct user email and password, a user is redirected from the authentication page to the user dashboard. Figure 6 shows the interface to capture the 1ogin credentials of users.
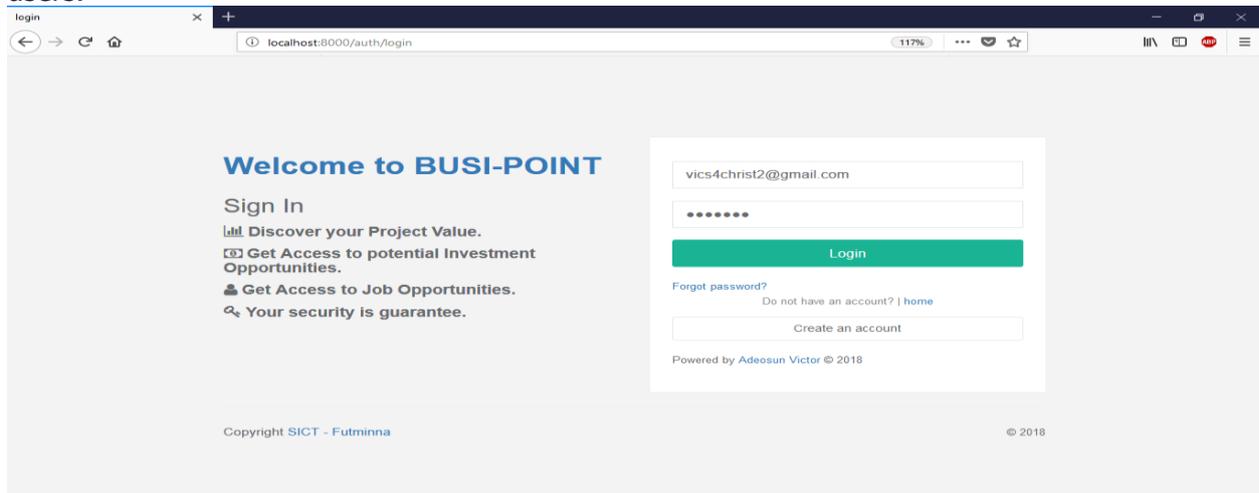

Figure 6: Authentication Page Designed Business Identification and Location System

User Dashboard Implementation

The User Dashboard provides the users with a lot of sub-menu functions, the user dashboard holds several sections of activities that are going on the implemented system. The user can see the recent business added, recent feed, job vacancies by a business, comments on business and lots more. The user dashboard provides the authenticated user

with a general preview of activities and provides a navigational start point for the user. This is shown in Figure 7.
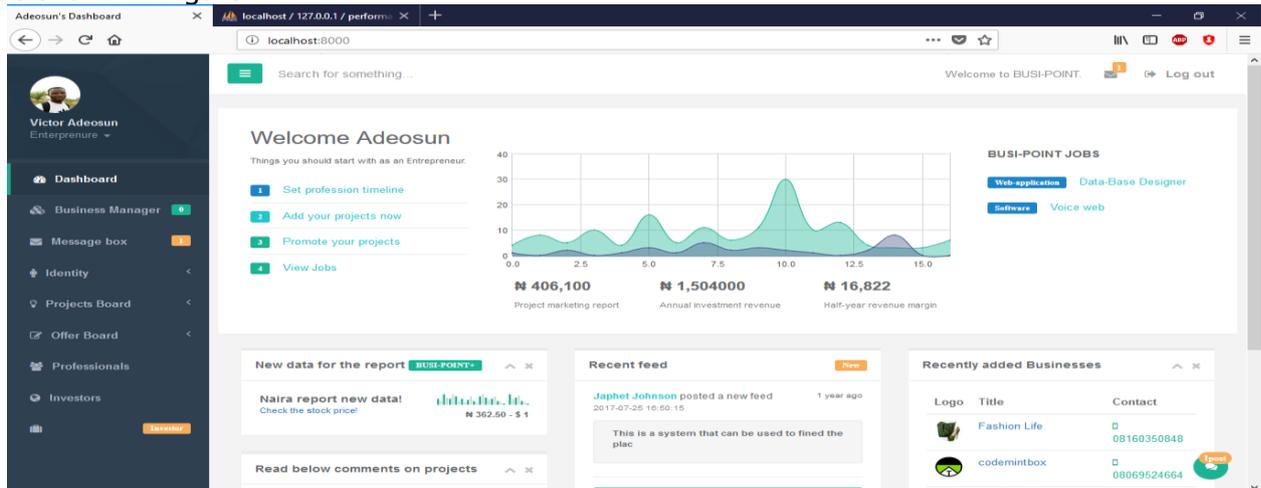

Figure 7: User Dashboard of the Designed System

Add Location Implementation

This Functionality allows a business owner to set the location of their business by dragging the location marker on the map to the location of the business. This will automatically set the longitude and the latitude of the position which can then be saved. The longitude and latitude will be used to plot the map for the user that intends to find the business location. This module is very important as every business registered will need to have a location points assigned to it or else it cannot have a map on the system. This is shown in Figure 8.
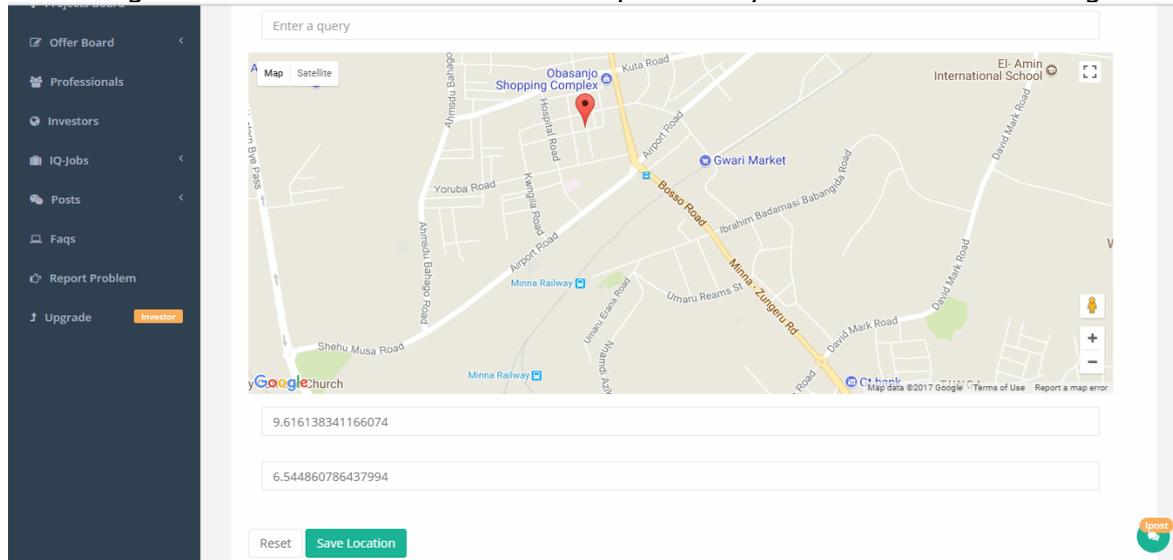

Figure 8: Add Location of a Business of the Designed System

Mobi1e Views

For consistency the Android views take the style and design of the web-based interface. The four (4) views are the home page, view business page, search result page and the comment section. These are shown in Figure 9.
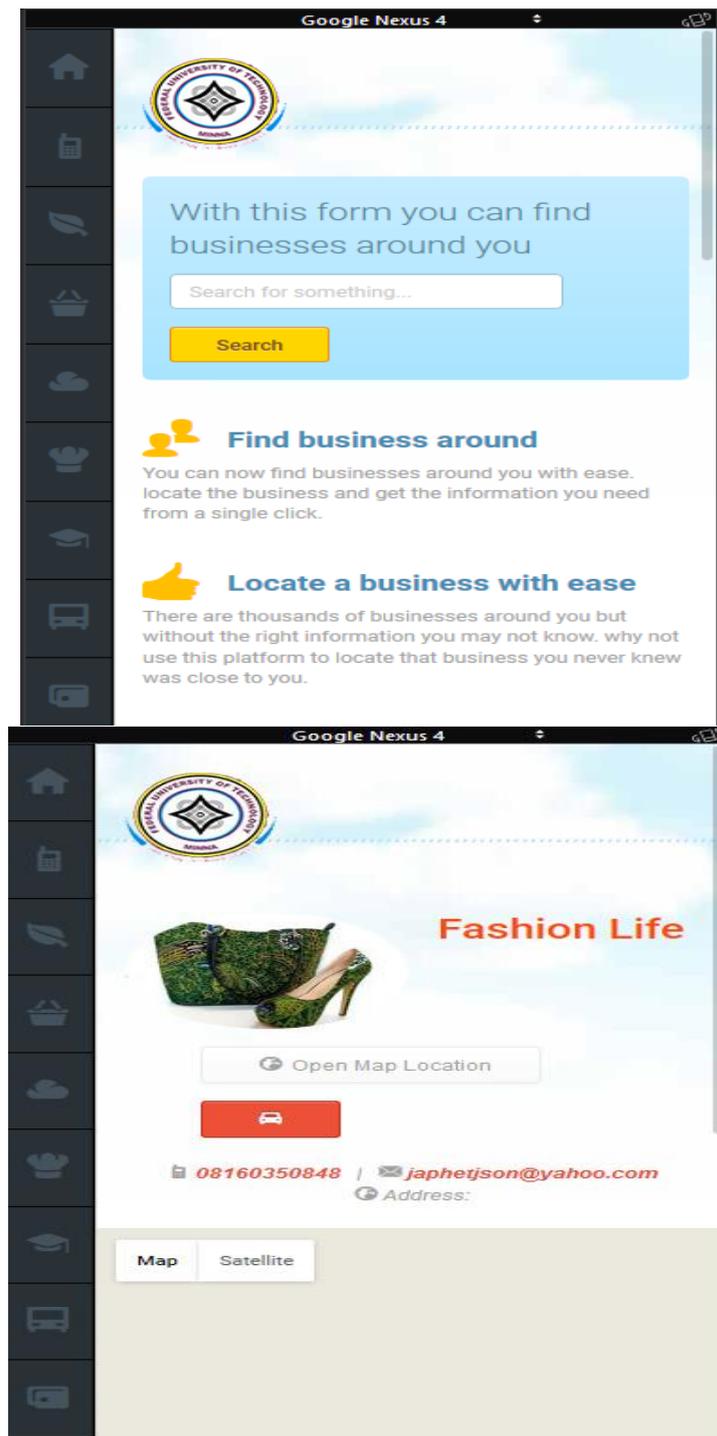
Figure 9: Mobile View of the Designed System

Conclusion

A web-based business directory particularly for identifying, locating and publicizing small and medium enterprises (SMEs) with proximity listing for maximum patronage was implemented. This development affords professionals, business owners and investors to showcase their businesses for patronage and for the customers seeking a particular goods or services to get the needed goods and services delivered to them. The added functionality (proximity listing) introduced in the implemented system which make it unique, effective and efficient.

References

Adegbuyi, O. A., Akinyele, F. A., & Akinyele, S. T. (2015). Effect of social media marketing on small scale business performance in Ota-Metropolis, Nigeria. *International Journal of Social Sciences and Management*, 2(3), 275-283. doi: http://dx.doi.org/10.3126/ijssm.v2i3.12721.

Afolalu, C. A., Olatunji, K. A., & Nwagbo, C. C. (2016). A point-of-interest directory for mobile tourists in Abuja, Nigeria. *Journal of Multidisciplinary Engineering Science and Technology (JMEST),* 3(10), 2458-9403.

Duggug, S. I. (2013). Entrepreneurship and small businesses: A strategy to alleviating poverty and corruption. *GSTF International Journal on Business Review*, 3(1), 57 – 66.

John, K. (2011). Online Geographical Directory

Kayode, K. B., & Ilesanmi, A. O. (2014). Determinant of factors influencing capacity of small and medium scale enterprise (SMES) in employment creation in Lagos state. *International Journal of Financial Research,* 5(2), 133- 141.

Pete, K., & Jennifer, L. B. (2016). Online directory with contact information. *U.S. Cl.* 726(28), 715/738.

Rohit, D., Pravin, C., Sushant, R., Sunikumari, S., & Vandana, N. (2016). Mobile application for shopping mall directory. *International Research Journal of Engineering and Technology, 3(9),* 2395 - 0056.

Olaniyan, A. M. (2010). The use of web directories as ingredients for architectural research in Nigeria. *Continental J. Information Technology, 4,* 1-8.

Sherry, Y. C. (2005). A flexible interface design for web directories to accommodate different cognitive styles. *The American Society for Information Science and Technology, 56*(1), 70–83.

SMEDAN (2013). Small and medium enterprises development agency and national bureau of statistics collaborative survey: Selected findings 2013, Abuja. Retrieved from www.nigerianstat.gov.ng

Suselo, T., & Dwiandiyanta, B. Y. (2013). Prototype of business directory for micro, small and medium enterprises using google maps API and multimedia. *International Journal of Computer and Information Engineering, 7*(11), 1307-6892.

VijayaPrasad, P., Nurul, F., Murad, S., Abdelrahman, E., & Bader, S. (2013). Shopping mall directory: A detailed-guide application for android-based mobile devices. *ARPN Journal of Systems and Software,* 3(6), 2222-9833.

Yolande, S., & Watkins, J. A. (2012). A literature review of small and medium enterprises (SME) risk management practices in South Africa. *African Journal of Business Management,* 6(21), 6324-6330.